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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/115,331	07/14/1998	THOMAS MOSSBERG	EWG-063-C	1260

7590 11/25/2003

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EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 11/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/115,331

Applicant(s)

MOSSBERG ET AL.

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on September 5, 2003, which has been entered as paper number 7.
- By this amendment, the applicant has canceled claims 1-16 and has newly added claims 17-38.
- Claims 17-38 remain pending in this application.
- The rejections to claims 1-16 under 35 USC 112, first paragraph, and the objections to claims 1-16 set forth in the previous Office Action are withdrawn in response to applicant's amendment.

Response to Amendment

1. The amendment filed on September 5, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **the newly added claim 21** recites to include an "active device" that dynamically reprogram each sub-grating. The specification fails to teach such "active device".

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claim 21 is rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s),

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at the time the application was filed, had possession of the claimed invention. The reasons for rejection based on the newly added matters are set forth in the previous paragraph.

4. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was **not** described in the specification in such a way as to **enable** one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification and the claims fail to teach how could both amplitude and the phase parameters, (i.e. more than two variables) be determined by a single function. This is mathematically impossible.

Claim Objections

5. Claims 18, 19-21 and 38, are objected to because of the following informalities:

(1). The phrase “phase shift ... introduced by a variation in a thickness of substrate or by use of a superimposed phase mask” recited in claim 18 is confusing and indefinite since the two alternative elements recited in the *alternating phrase* are **not equivalent** to each. The “variation of the thickness of the substrate” is the **structure** of the grating for the phase shift; the “phase mask” is referred to the **process of making** the phase shift. They are not equivalent therefore making the scope of the claims unclear.

(2). The phrase “the complex-values spectral transfer function”, the phrase “the input optical field”, and the phrase “the filtered optical field” recited in claims 18 and 19 respectively are confusing and indefinite since they each lacks a **proper antecedent basis** from its based claim.

(3). The phrase “the complex-value spectral function”, the “a spatial Fourier transform of an ith sub-grating” recited in claim 18 is confusing and indefinite. It is not clear what is the complex-value spectral function and what does this function relate to? It is not clear what defines or provides such

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function. The phrase “spatial Fourier transform of an ith sub-grating” is simply wrong since the Fourier transform is not about the sub-grating. The sub-grating cannot be Fourier transformed.

(4). The mathematical expression recited in claim 18 is not well defined since there are certain symbols not defined. For instance, “ x_i^a ” and “ x_i^d ”, and “v”, etc.

(5). It is not clear what is considered to be a “*spatial* phase shift” and what is considered to be an “*optical* phase shift”.

(6). The phrase “a Fourier spectrum of a reference waveform” recited in claim 38 is confusing and indefinite since it is not clear what does this phrase mean.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claims 17, 19-20, 24-26, 27-28, 30, 36, 37 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Spillman (PN. 4,985,624).**

Spillman teaches a multi-period diffractive grating (20, Figure 1) that is formed on a *common substrate* wherein the diffractive grating comprises a *plurality of sub-gratings* (22 and 24) each have a pair of lateral edges and a periodic array of grating lines, serves as the *diffraction elements*, wherein the sub-gratings *are positioned adjacent* to each other with their lateral edges *abutting* to each other at the boundary (26, please see Figure 1 and column 4, lines 3-17).

With regard to claims 19-20, 27-28 and 36-37, Spillman teaches that the multi-period diffractive grating is applied in an optical apparatus wherein *an input optical field* generated by a *broadband light*

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source (12) is incident upon it. It is implicitly true that the diffractive grating will diffract the input optical field and which produces a *filtered output optical field*, as shown in Figure 1. A broadband light source implicitly generates an optical field having temporal waveform, (i.e. a standard wave function packet comprises temporal function). It is therefore implicitly true that the filtered output optical field will also have a temporal waveform correspondingly. The multi-period diffraction grating defines a *complex transfer function* having certain *spatial phase shift, and amplitude* which imparts a filter function to the input optical field. The temporal structure of the output field can be essentially matching with a reference optical waveform since the reference function is arbitrarily defined. With regard to claims 28 and 38, it is implicitly true that the transfer function is defined by the *cross correlation function* of the input optical field and a reference waveform, (the reference waveform could be arbitrary or by the diffraction theory the reference function could be identified as the filtered output optical field). The transfer function also can be corresponding to a complex-conjugate of Fourier transformation of a reference optical waveform, (since the reference is arbitrarily defined here), since it is implicitly true that a function can be expressed as Fourier series.

With regard to claims 24-26, and 30, Spillman teaches that the multi-period grating is a *reflective* grating and it can either be formed on a *planar surface* or a *non-planar surface*, (please see Figures 1 and 2).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 18, 22-23 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Spillman.

The multi-period diffractive grating taught by Spillman as described for claims 17 and 27 above has met all the limitations of the claims. With regard to claim 18, this reference does not teach explicitly that the amplitude and phase parameters of the grating are defined by the cited mathematic expression. However the specification fails to teach how could two variables (amplitude and phase parameters) be determined by a single function. Furthermore, it is implicitly true that the multi-period grating introduces phase shift which is a function of spatial coordinate of the grating and has a spatial amplitude, wherein the function of the grating can be described by a transfer function which is in general a function of amplitude and phase shift of the grating. Since the transfer function filters the input optical field to create the filtered output field it would have been within the general skill of the art to calculate or determine the phase and/or amplitude of the grating. Such modification therefore would have been obvious to one skilled in the art for determining the phase and amplitude of the grating.

With regard to claim 22, this reference does not teach explicitly that the optical thickness of the sub-grating is controlled by the physical thickness of the sub-grating however such modification is considered to be obvious to one skilled in the art since it is known in the art that an optical thickness is defined by the physical thickness times the refractive index of the medium, it would be more than obvious to one skilled in the art to change the optical thickness by simply varying the physical thickness for the benefit of changing the phase shift value.

With regard to claims 23 and 30, this reference also does not teach explicitly that the multi-period grating is of transmissive mode, however to make the grating reflective or transmissive is considered as obvious matters of design choice to one skilled in the art for the benefit of making the grating fitted for different application arrangement.

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10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Spillman as applied to claim 17 above, and further in view of the patent issued to Yariv (PN. 5,832,148).

The multi-period diffractive grating taught by Spillman as described for claims 17 above has met all the limitations of the claims. With regard to claim 21, this reference does not teach to include an “active device” that dynamically reprograms the sub-gratings. However the instant application also fails to disclose such in the specification. This feature can therefore only be examined briefly. It is known in the art to use active medium, such as electronically addressable medium, to create diffraction grating, as taught by Yariv, (please see Figure 2) to provide electrical control to the diffractive grating, it would then have been obvious to one skilled in the to replace the grating medium by an electrically adjustable or active medium for the benefit of providing a means to adjust and drive the diffractive grating to achieve desired optical properties.

11. Claims 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Jalali et al (PN. 5,793,907) in view of the patents issued to Yariv and Spillman.

Jalali et al teaches a *code division multiple access system* (CDMA) that is comprised of a *phased arrayed waveguide grating*, serves as the plurality of segmented sub-gratings for imparting different time delay to input optical signal having a plurality of wavelength components to create time coded optical signal. The time coded optical signal is then passing through another (or the same as in Figure 10) phased arrayed waveguide grating for creating a temporal output signal, (please see Figures 1, 6 and 10). This reference however teaches that the input signal is demultiplexed and then multiplexed, but not multiplexed then demultiplexed, by the phased arrayed waveguide grating to create the time coded output signal. Yariv in the same field of endeavor teaches that the input optical signal having a plurality of

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wavelength components is multiplexed and then demultiplexed by the waveguide diffractive structure, (please see Figure 3A), having a plurality of sub-gratings, (207, 208 and 209) so that different components of the output signal are spatially separated into different direction. It would then have been obvious to one skilled in the art to apply the teachings of Yariv to modify the code division multiple access system to have multiplex/demultiplex arrangement so that the components of the output signal having different time code can be spatially separated and directed. These references further do not teach explicitly that the sub-gratings have lateral edges that are abutting to each other for the adjacent sub-gratings. **Spillman** in the same field of endeavor teaches a multi-period diffractive grating (20, Figure 1) that is formed on a common substrate wherein the diffractive grating comprises a plurality of sub-gratings (22 and 24) each have a pair of lateral edges and a periodic array of grating lines, serves as the diffraction elements, wherein the sub-gratings are positioned adjacent to each other with their lateral edges **abutting** to each other at the boundary (26, please see Figure 1 and column 4, lines 3-17). The grating is reflective and can be formed on either planar or non-planar surface. It would then have been obvious to one skilled in the art to apply the teachings of Spillman to modify the sub-gratings for the benefit of making the sub-gratings with compact structure. It further would have been obvious matters of design choice to one skilled in the art to make the grating a *transmissive* one for the benefit of making the grating fitted for different application arrangement.

Double Patenting

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the

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conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 17-38 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 of U.S. Patent No. 6,314,220. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim a diffractive structure having plurality of sub-gratings.

Response to Arguments

13. Applicant's arguments filed on September 5, 2003 have been fully considered but they are not persuasive. The newly submitted claims have been fully considered and they are rejected for the reasons stated above.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.